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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/960,479	09/24/2001	Mitsuo Tokuda	29284/548	5800

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Edward W. Greason
Kenyon & Kenyon
One Broadway
New York, NY 10004

EXAMINER	
HUGHES, JAMES P	
ART UNIT	PAPER NUMBER
2881	

DATE MAILED: 08/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/960,479	TOKUDA ET AL.
	Examiner	Art Unit
	James P. Hughes	2881

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *the amendment received June 13, 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disp sition of Claims

4)☒ Claim(s) *1 and 3-15* is/are pending in the application.

4a) Of the above claim(s) *2 and 16* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 September 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. Claims 2 and 16 are cancelled per applicants' request.

Claim Objections

2. Claim 15 is objected to because it fails to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The phrases "said probe holder" in lines 21 and 24 of the claim do not clearly identify which probe holder (the first or the second) is referenced. Perhaps a word such as "first" or "second" should be added to clarify which probe holder is referenced.

Additionally, the phrase "said introduction part" in line 24 of the claim does not clearly identify which introduction part (the first or the second) is referenced. Perhaps a word such as "first" or "second" should be added to clarify which introduction part is referenced.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> +(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1 and 3-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomimatsu et al. (EP 0 927 880).

Tomimatsu et al. (EP 0 927 880) teaches a method and apparatus for preparing minute samples comprising; a focused ion-beam optical system (1) for irradiating an ion beam (13) to a sample (2) – which may be a semiconductor wafer or chip – placed on a sample stage (3), a probe (11) for supporting a minute sample cut out by an ion beam (13) wherein the probe (11) is held with a probe holder (or first probe holder as in Claim 15) – by probe driver (4) – and moved by a moving mechanism [probe-driver controller (4') and linked to the CPU (6) which also controls the sample position controller (3')]. Additionally, the method and apparatus of Tomimatsu et al. comprises an electron beam optical system (9) and a detector (12) for detecting secondary particles discharged from the sample (2), wherein the entire system is arranged in a vacuum container (77). (Paragraphs 33-34; Col.12, ll. 6-42 and Fig. 1, for example).

The focused ion-beam optical system (1) may comprise the common elements of an ion source (41), a lens (50) for focusing the ion beam, and an ion beam scanning deflector (52). (Paragraph 43, Col. 15, ll. 3-55 for example). The electron beam optical system (9) comprises a deflector lens (15) and inherently comprises a lens for focusing an electron beam. (Paragraph 39, Col. 14, ll. 7-25, for example)

Regarding Claims 1 and 9, Tomimatsu et al. teaches that the moving mechanism may move the probe (11) (and the minute sample) in three dimensional control with fine motion control access (Paragraphs 47-56, Col. 17, ll. 30-55, for example), and the electron beam optical system (9) may be used to image the surface of the area to be observed in the cut-out minute sample. (Paragraph 39, Col. 14, ll. 7-41, for example) Thus, it would have been known to one of

ordinary skill in the art that a section on the cut-out minute sample becomes substantially perpendicular to an optical axis of the electron beam as is common in electron beam imaging.

Regarding Claim 3, 4, 8, and 11, Tomimatsu et al. teaches that the moving mechanism may move the probe (11) (and the minute sample) in three dimensional control with fine motion control access (Paragraphs 47-56, Col. 17, ll. 30-55, for example), and the electron beam optical system (9) may be used to image the surface of the area to be observed in the cut-out minute sample. (Paragraph 39, Col. 14, ll. 7-41, for example) Thus, it would have been known to one of ordinary skill in the art that the moving mechanism has a function of adjusting a position and an attitude of the minute sample with respect to the electron beam.

Additionally, the moving mechanism also comprises the sample stage controller (3') that drives the sample stage (3), which contains a second sample stage – the TEM sample holder – (19). (Paragraphs 33-37, Col. 12, ll. 7 – Col. 13, ll. 35 and Paragraph 41, for example) Tomimatsu et al. teaches that after the cut-out minute sample is placed on the TEM sample holder (19), the ion beam may again irradiate the cut-out minute sample to carry out a thinning finishing process. (Paragraph 80, Col. 28, ll. 3-8, for example) Thus, it would have been obvious to one of ordinary skill in the art that the moving mechanism may be used to adjust a position and an attitude of the minute sample with respect to the ion beam (or electron beam for monitoring the process) as is described in Claim 3. It would also have been obvious to one of ordinary skill in the art that the moving mechanism may comprise a function of controlling an application angle of the ion beam (or electron beam for monitoring the process) as is described in Claim 4.

Regarding Claims 5 and 7, as discussed above, Tomimatsu et al. teaches a second sample stage – TEM sample holder – (19) on which a plurality of minute samples conveyed by said moving mechanism can be mounted. (Paragraph 79-80, Col. 26, ll. 55 – Col. 28, ll. 7) It would have been obvious to one of ordinary skill in the art that the second sample stage would comprise a rotating mechanism for changing the application angle of the ion beam or electron beam to said plurality of minute samples to conduct the thinning finishing process (Paragraph 80, Col. 28, ll. 3-8, for example) and imaging discussed above.

Regarding Claim 6, it would have been obvious to one of ordinary skill in the art to include a detector for detecting an X-ray generated from said sample or minute sample resulting from application of the electron beam because as admitted by applicant in section #21 of the "Prior Art Statement" received on February 5, 2003, the use of such detectors for analyzing material inside a charged-particle instrument is well known.

Regarding Claim 10, as admitted by applicant in section #26 of the "Prior Art Statement" received on February 5, 2003, Tomimatsu et al. teaches a processing method where the resulting shape of the minute sample is tetrahedron or pentahedron (Figs. 17, 18, 27).

4. Claims 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomimatsu et al. (EP 0 927 880) in view of Masaru et al. (JP 2000-251820).

Tomimatsu et al. (EP 0 927 880) teaches a method and apparatus for preparing minute samples as discussed above in section 3. The sample stage (3) of Tomimatsu et al. is connected to a sample stage controller (3'), which is connected to a central CPU (6). The sample stage (3) is designed so that the stage (3) can be moved in the three-dimensional directions (namely the X,

Y, Z axial directions), can be tilted and can be rotated. (Paragraph 87, Col. 31, ll. 13-21, for example) Thus, the sample stage (3) is for placing the sample (2) in the vacuum chamber (77) and moving the sample (2) in a direction perpendicular to an axis of the charged particle beam (13).

The second probe holder – holder cassette – (17) holds the cut-out minute sample (40) holder (19) and takes the extracted sample(s) out of said vacuum container (77). (Paragraph 87, Col. 31, ll. 5-21, for example)

The moving mechanism has a structure of moving the probe – or needle member – (11), and inclining (or slanted) said needle member to a surface (or the moving direction) of the sample stage (3). (Fig. 1 and Paragraphs 33-34; Col.12, ll. 6-42 and Fig. 1, for example)

However, Tomimatsu et al. (EP 0 927 880) does not explicitly teach an introduction mechanism capable of introducing and exacting the probe holder into and from said vacuum container.

Masaru et al. (JP 2000-251820) teaches an introduction mechanism capable of introducing and extracting a probe holder (5) and probe – or needle member – (4) from and handling minute samples in a vacuum chamber (1), wherein the probe holder may be introduced and extracted from the chamber independently without bringing the chamber to atmospheric pressure. This probe is protected by cover member with a structure that may be inclined to the surface of a sample stage (78) (see the far right end of Fig. 7b) that may be disposed within a movement range of the sample stage (78). Masaru also teaches that two similar probes may be

used (Fig. 9). Masaru discloses that this probe will increase the operation rate by shortening stopping time, thus allowing more efficient sample processing. (Abstract, lines 1-15)

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the probe holder of Masaru with the method and apparatus of Tomimatsu et al. because this would allow micro samples from a sample to be individually removed from the apparatus and analyzed via other foams than available in the apparatus without brining the whole apparatus to atmospheric conditions, thus increasing processing efficiency as disclosed by Masaru.

As for Claim 15, which was objected to in section 2 above because it fails to particularly point out and distinctly claim the subject matter which applicant regards as the invention; the rejection in this section also applies to the Offices' current understanding of the claim.

Regarding Claim 14, as admitted by applicant in section #28 of the "Prior Art Statement" received on February 5, 2003, the claimed two-beam system is well known in the art and is disclosed in Tomimatsu et al. [Fig. 1 and Paragraph 0034 (ion beam optical system l and electron beam optical system 9); and Paragraph 0035 discussing a sample stage capable of moving so the angle of the ion beam (and, necessarily, the electron beam) may be set at "a glancing angle and a rotation angle" with respect to the specimen substrate.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ohnishi et al. ("A New Focused-Ion-Beam Microsampling Technique for TEM..." disclosed by applicant) teaches – as admitted by applicant in section #3 of the "Prior Art

Statement" received on February 5, 2003 – rotation of a cut-out minute sample by means of a probe to make the sample perpendicular to an electron beam. (Figs. 1 and 3, p. 450)

Pawley (A dual Needle Piezoelectric Micromanipulator for the Scanning Electron Microscope) discloses – as admitted by applicant in section #17 of the "Prior Art Statement" received on February 5, 2003 – a mechanism capable of introducing and extracting a probe holder from a vacuum container. Pawley discloses a micromanipulator inserted into the specimen chamber of a scanning-electron microscope and retracted into an airlock. (Pawley, Fig. 1, p. 601).

Applicant's submission of an information disclosure statement under 37 CFR 1.97(c) with the fee set forth in 37 CFR 1.17(p) on February 5, 2003 prompted the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 609(B)(2)(i). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James P. Hughes whose telephone number is (703) 305-5675. The examiner can normally be reached on Monday - Friday 9am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (703) 308-4116. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

James P. Hughes
Examiner
Art Unit 2881

August 9, 2003 JH

JOHN R. LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800